



SUCCESS STORIES

The goal of the Million Solar Roofs Initiative is to install one million solar energy systems on U.S. buildings by 2010. President Clinton announced the Initiative on June 26, 1997 in a speech before the United Nations Session on Environment and Development. The Initiative focuses on two types of solar energy technology — photovoltaics that produce electricity from sunlight, and solar thermal systems that produce heat for domestic hot water, space heating or heating swimming pools. The U.S. Department of Energy leads this effort in partnership with the building industry, other federal agencies, utilities, the solar energy industry, financial institutions, state and local governments, and non-governmental organizations. These partnerships concentrate on removing market barriers and developing and strengthening demand for solar energy products and applications. As progress is made toward the goal of one million solar roofs, greenhouse gases and other harmful emissions will be reduced, high tech jobs will be created, and the U.S. solar energy industry will retain its competitive edge.



Project: Western Area Power Administration
Elverta Maintenance Facility

Type: Grid-Connected PV System

Location: Elverta, California

Background: The Western Area Power Administration is a Power Marketing Agency established in 1977 under the Department of Energy Organization Act. It markets and transmits more than 10,000 megawatts of electric power, primarily from the hydroelectric assets previously managed by the Bureau of Reclamation. It serves 638 wholesale customers in 15 western states from 56 powerplants, 16,857 miles of high voltage transmission lines and 258 substations.

In 1998, Western Area Power Administration (Western) installed a 38 kW PV system on its Elverta, California Maintenance Facility. The system is the culmination of a step by step process by Western to develop the knowledge and experience to implement PV projects on its own. Western's first PV project, a 3 kW building-integrated prototype system (Powerguard by Powerlight Corporation) was installed in 1994 at its Folsom, CA site. Western partnered with the Sacramento Municipal Utility District (SMUD), which provided the funding and technical expertise. Based on the success of the Folsom project, Western joined forces again with SMUD to submit a proposal for Round II of the Utility Photovoltaic Group (UPVG) TEAM-UP competition. The proposal, a 40 kW version of the 3 kW prototype Powerguard system at Folsom, was awarded a grant from the UPVG and installed in 1996 at Western's Elverta Maintenance Facility. SMUD and Western also provided funds. As with the Folsom project, Western collected data on the electrical performance of the PV modules as well as the thermal insulating attributes of the Powerguard system. These two projects enabled Western to leverage the financing and to learn from a recognized utility leader in photovoltaics. Based on the experience and confidence derived from partnering with SMUD, Western took the initiative to fully fund and implement the follow-on 38 kW project at



Elverta. The combined 40 and 38 kW Powerguard systems completely cover the Elverta roof and are the largest application of its kind in the continental United States. Western is now sharing its PV experiences with its public utility customers and encouraging them to initiate their own PV programs.

System Description: The 38 kW Powerguard system consists of 762 Solarex Millennia PV modules (43 Watts each) and 264APS modules (22 Watts each). The PV system uses thin film amorphous silicon and produces 38kW peak DC. The DC output from the PV modules are converted to 96 volt AC by a Trace inverter. The output is raised to 480 volts by a 45 KVA transformer for direct connection to the building's service panel. In addition to replacing grid power, the system protects the roof membrane and provides two inches of installation board, equivalent to R10 insulation, which reduces the cooling and heating loads and, thus, decreases energy consumption. The system generates 67,500 kWh/year and has a lifetime expectancy of 20 years.

Climate: The project site is located in the Central Valley of California, several miles north of Sacramento. It has a latitude of 38 degrees 31 minutes North, with a yearly average of 5.9 peak solar hours for a fixed array. The summers are hot and sunny and the winters have intermittent rain and fog.

Financing: Although Western used TEAM-UP and SMUD funding for previous PV projects, this system was paid for and is owned by Western Power Area Administration.

Total installed cost: \$231,000

Direct Savings: \$9,900 annually

Indirect savings: The insulating properties of the Powerguard System decreased the roof temperature about 20 degrees Celsius. This reduced the cooling load on the air conditioners and the resulting electrical consumption. The PV system also protects the single ply membrane roof from UV radiation, thus increasing its life. The dollar savings for these additional benefits have not been calculated.

Environmental benefits: Over its 20 year expected lifetime, the system prevent 2,300 tons of carbon dioxide, 8.7 tons of nitrous oxide, and 16.4 tons of sulfur dioxide from entering the environment.

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